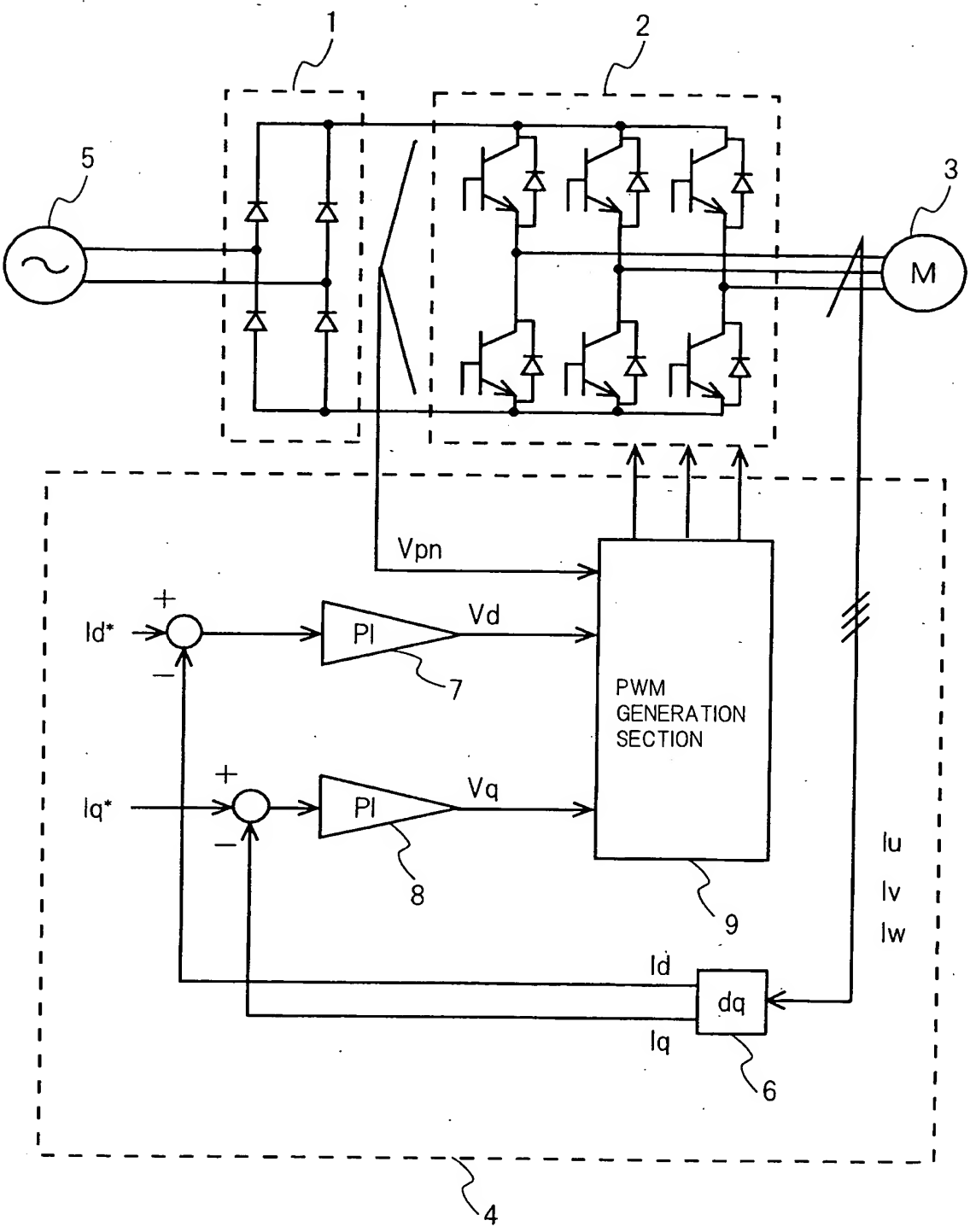
Title: Motor Control Apparatus
Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US Cust. No.: 000570
Atty. Doc. No.: 208861.0480/480US (P32440-01)

FIG. 1



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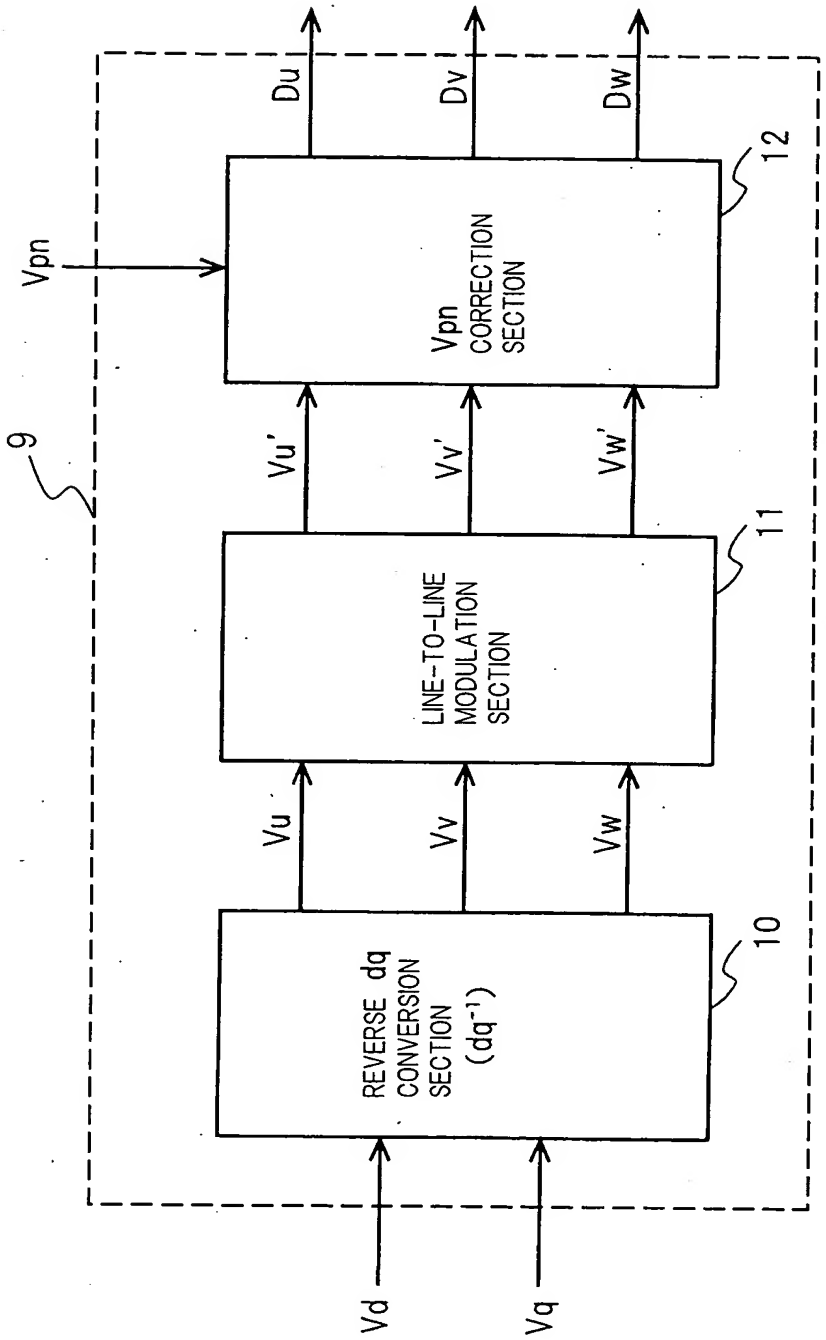
Cust. No.: 000570
(P32440-01)

FIG. 2



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Exp. Mail No.: EV312204097US Cust. No.: 000570
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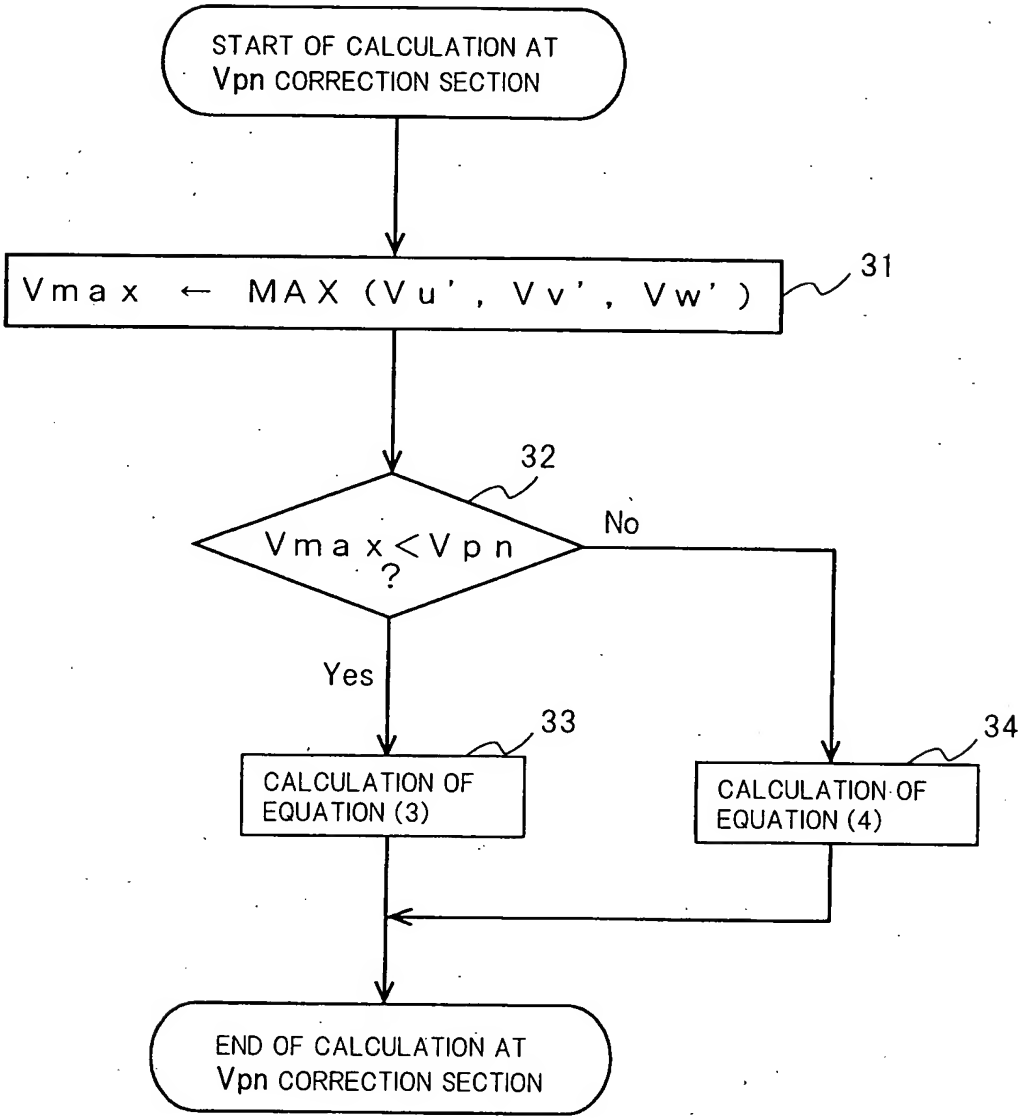
FIG. 3



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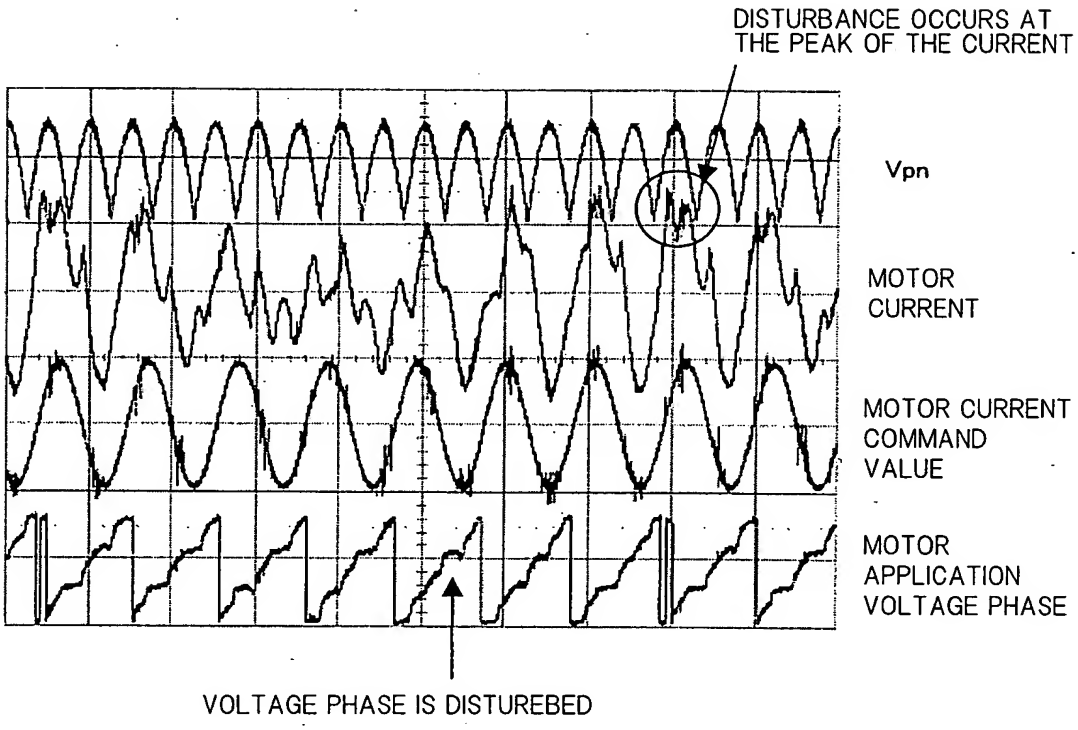
Exp. Mail No.: EV312204097US
Atty. Doc. No.: 208861.0480/480US
Cust. No.: 000570
(P32440-01)

FIG. 4A



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Exp. Mail No.: EV312204097US
Atty. Doc. No.: 208861.0480/480US
Cust. No.: 000570
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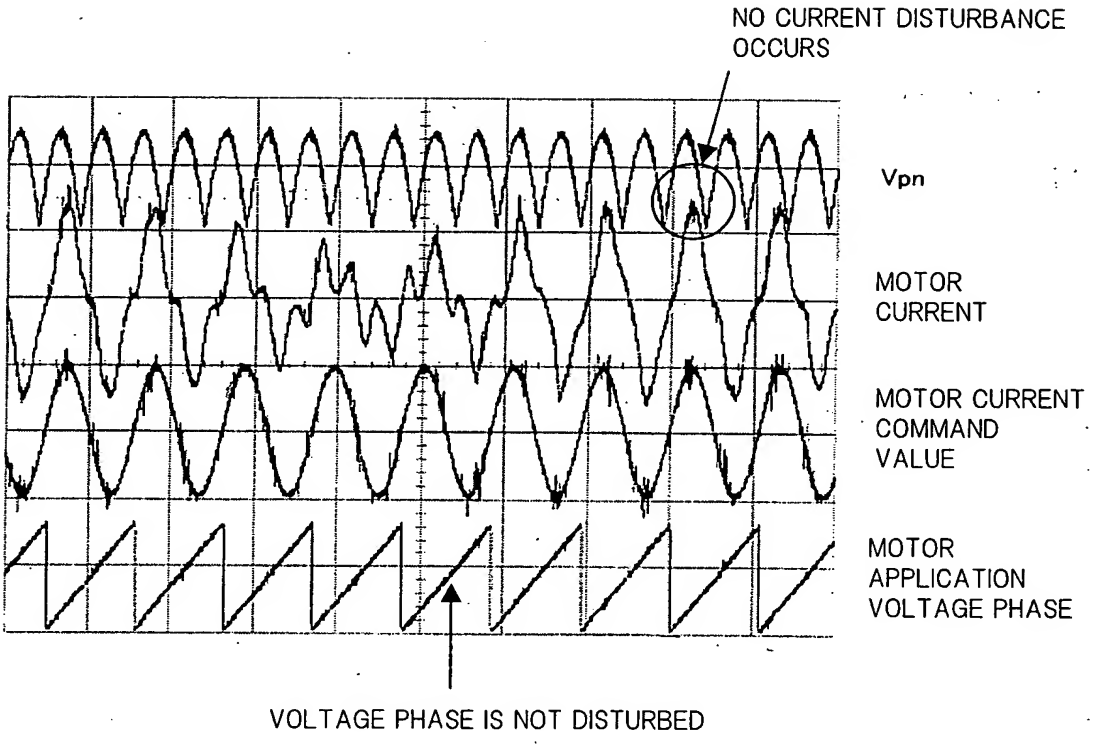
FIG. 4B



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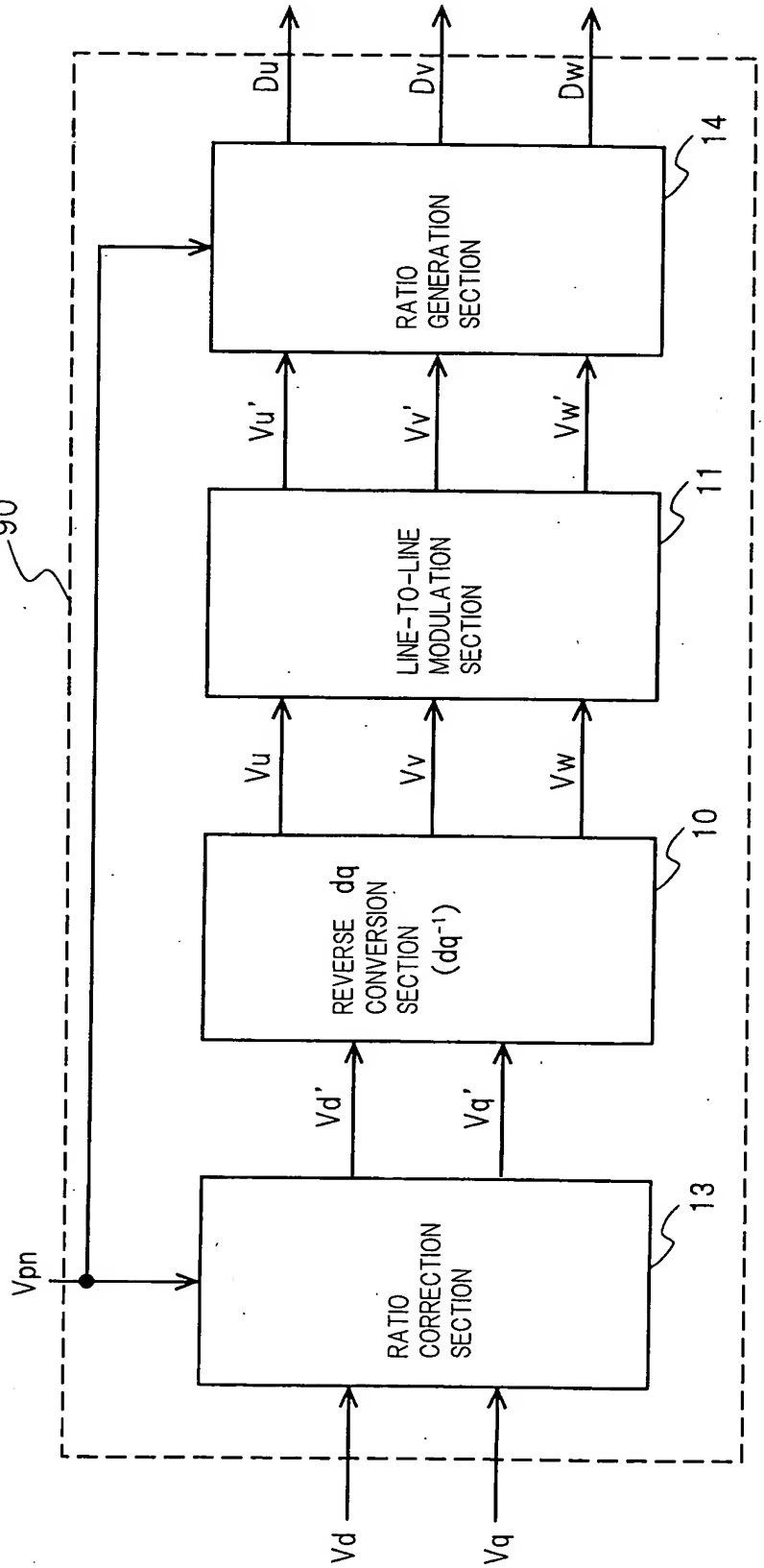
Exp. Mail No.: EV312204097US
Atty. Doc. No.: 208861.0480/480US
Cust. No.: 000570
(P32440-01)

FIG. 5



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Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US
Atty. Doc. No.: 208861.0480/480US
Cust. No.: 000570
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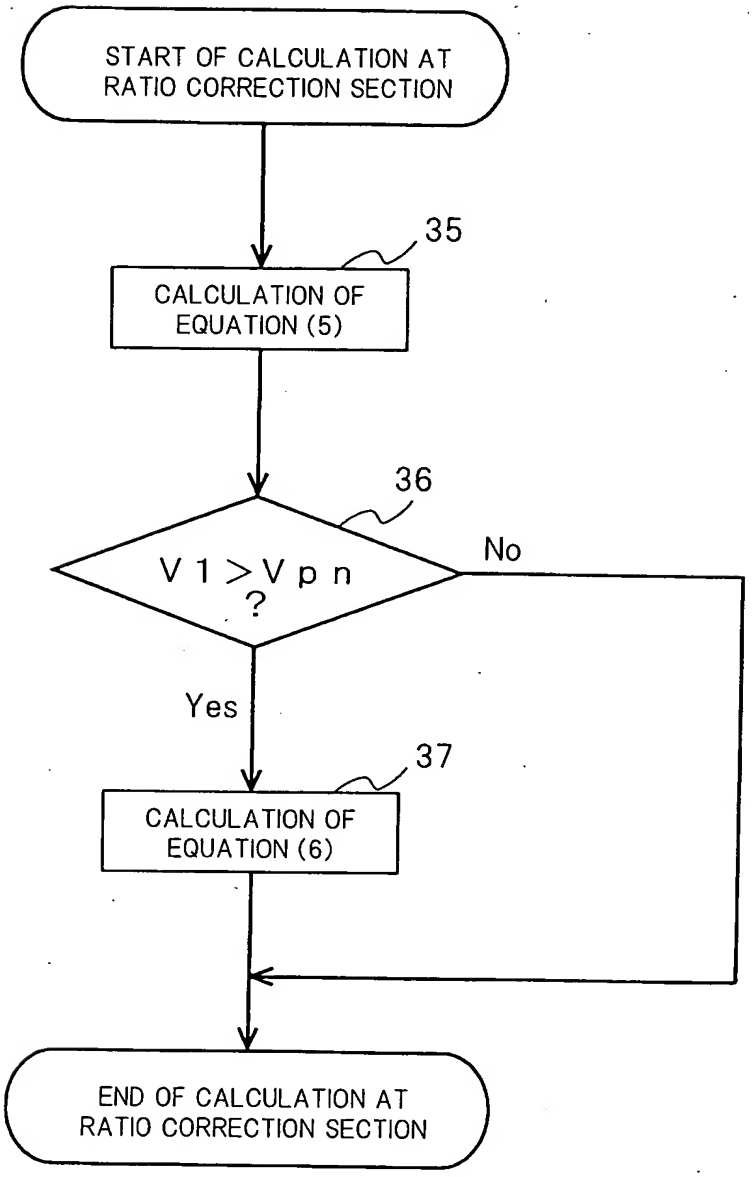
FIG. 6



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Exp. Mail No.: EV312204097US
Atty. Doc. No.: 208861.0480/480US
Cust. No.: 000570
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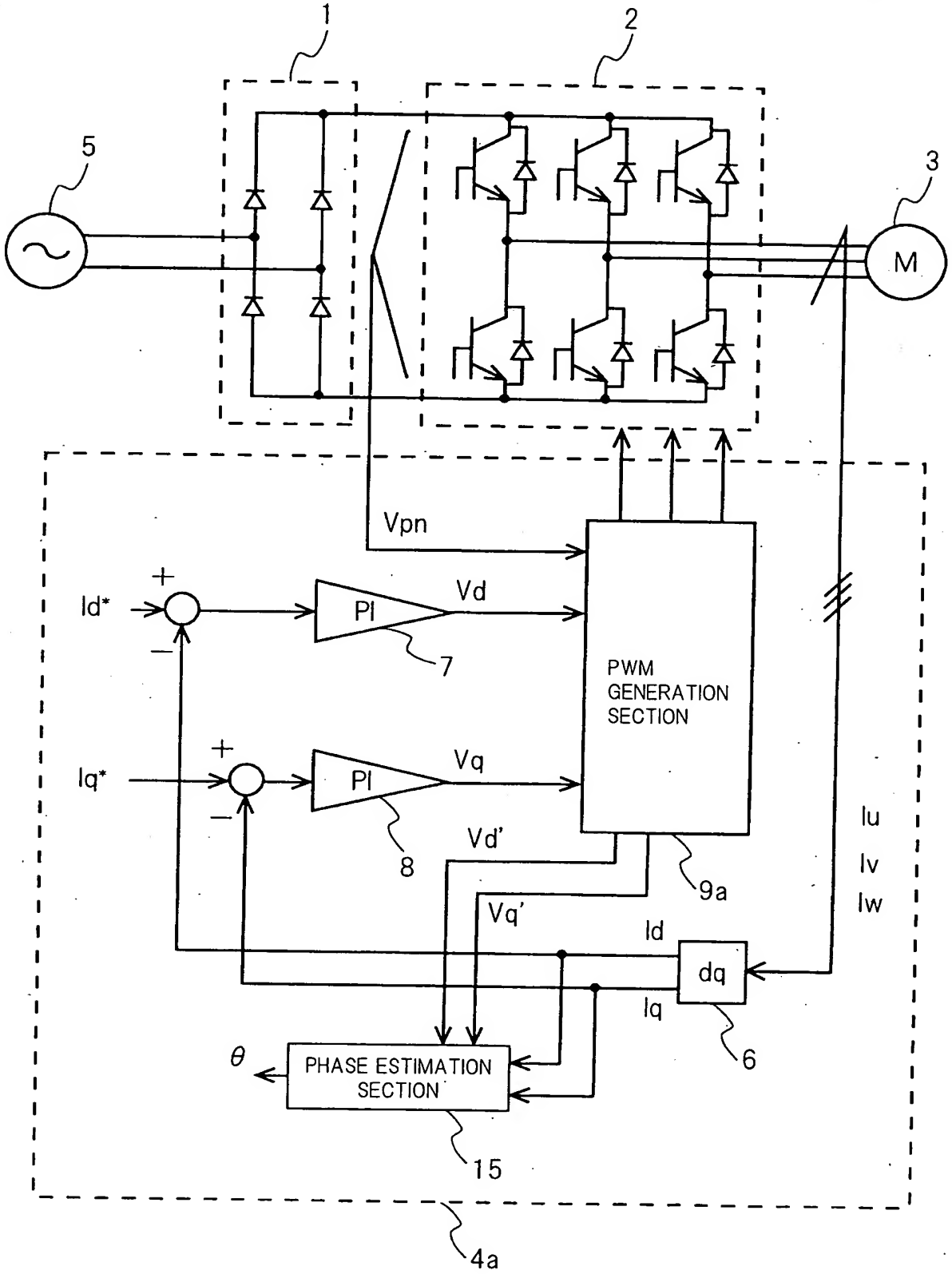
FIG. 7



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Exp. Mail No.: EV312204097US
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(P32440-01)

FIG. 8A

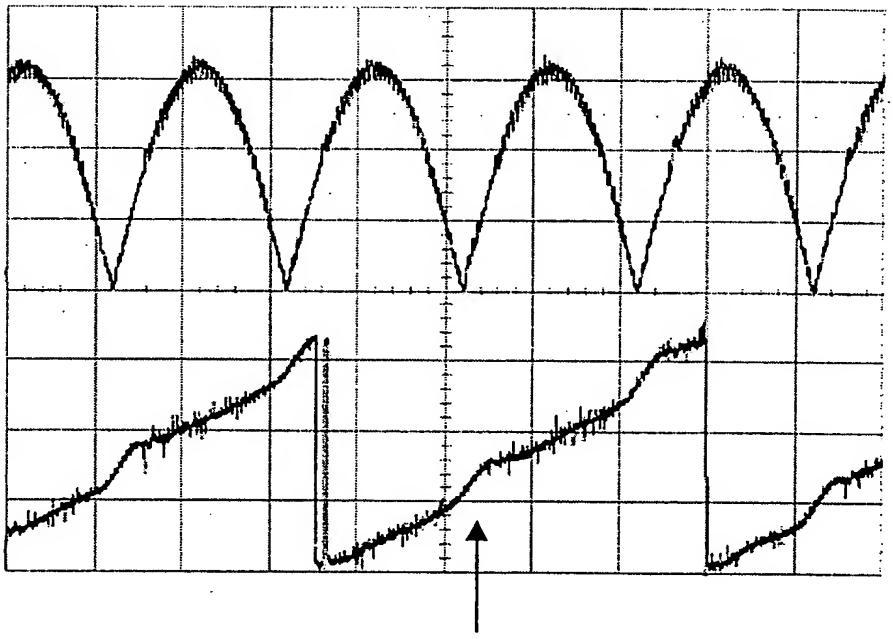

FIG. 8B

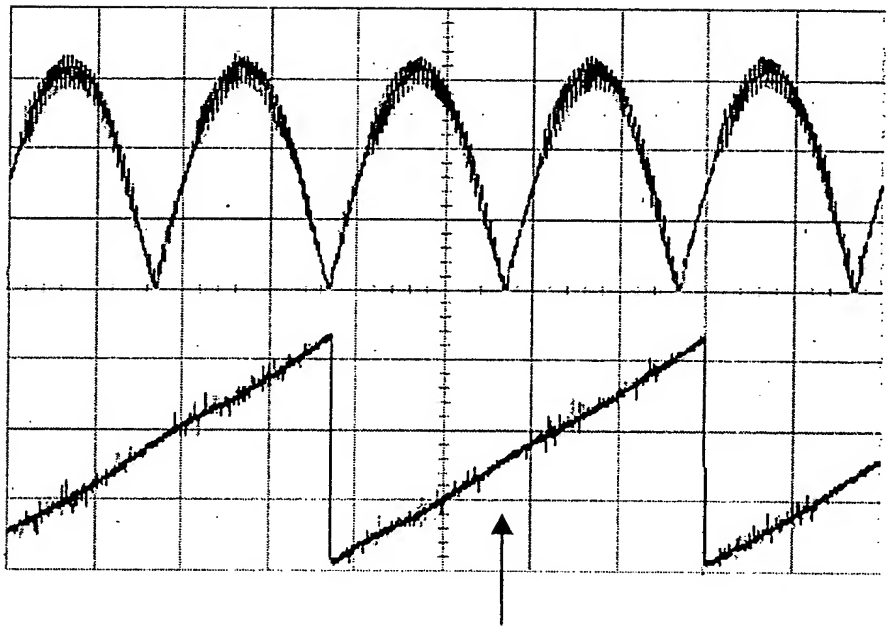
Vpn
ESTIMATED PHASE
ESTIMATED PHASE IS PROPER EVEN WHEN Vpn IS SMALL

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FIG. 9

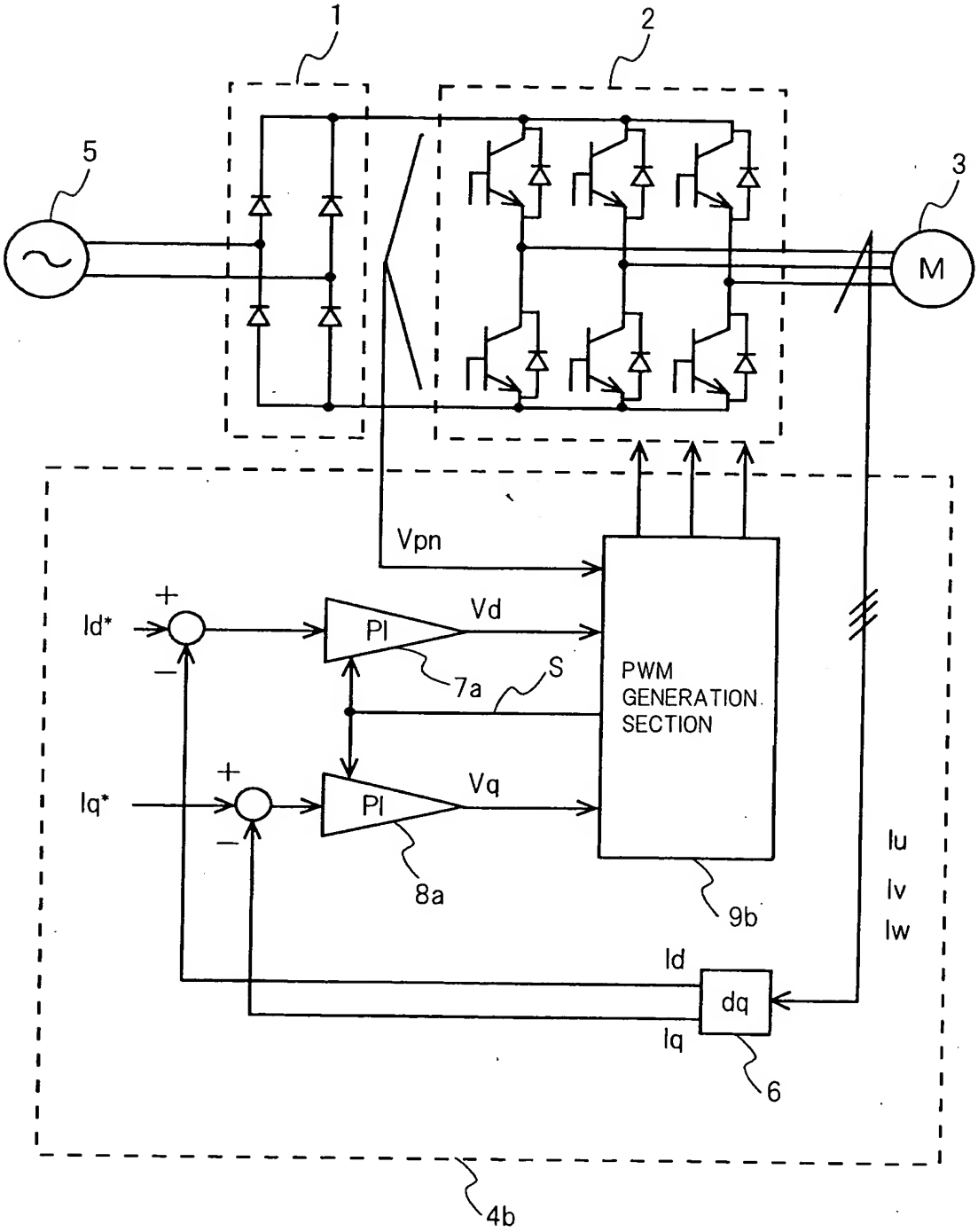
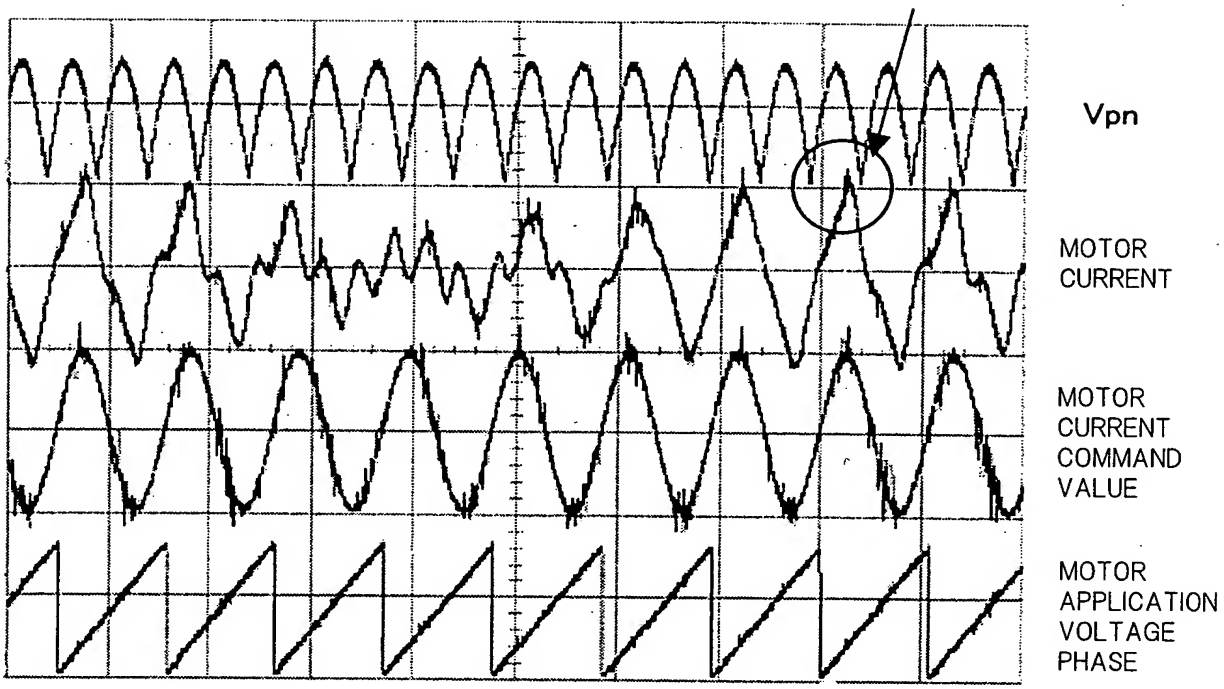


FIG. 10


Vpn
MOTOR CURRENT
MOTOR CURRENT COMMAND VALUE
MOTOR APPLICATION VOLTAGE PHASE

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Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US Cust. No.: 000570
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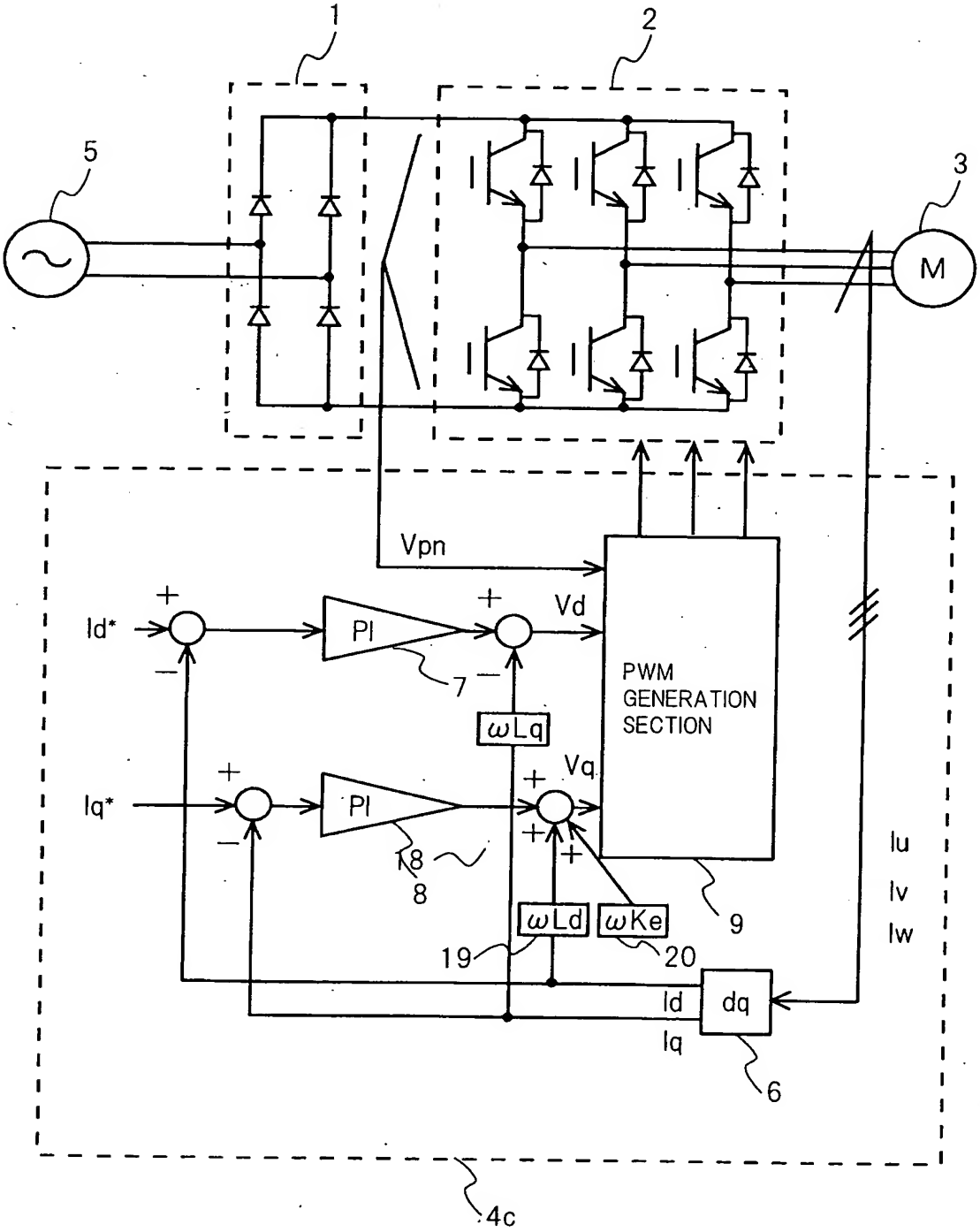
FIG. 11



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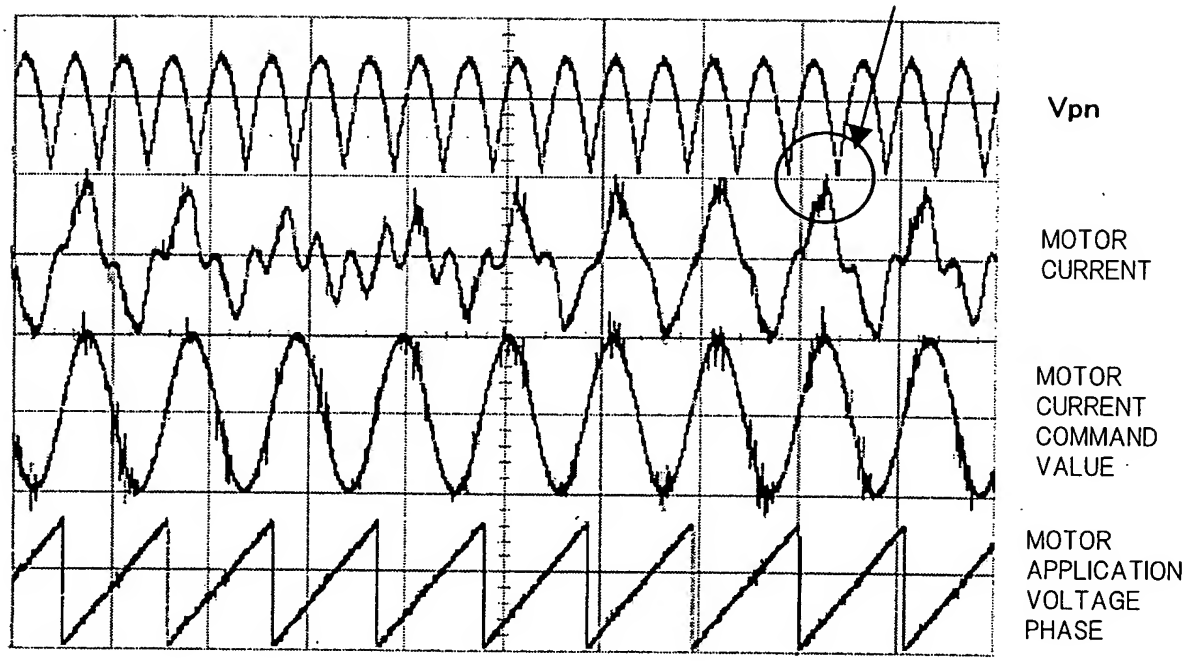
Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US **Cust. No.:** 000570
Atty. Doc. No.: 208861.0480/480US (P32440-01)

FIG. 12



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Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US Cust. No.: 000570
Atty. Doc. No.: 208861.0480/480US (P32440-01)

FIG. 13

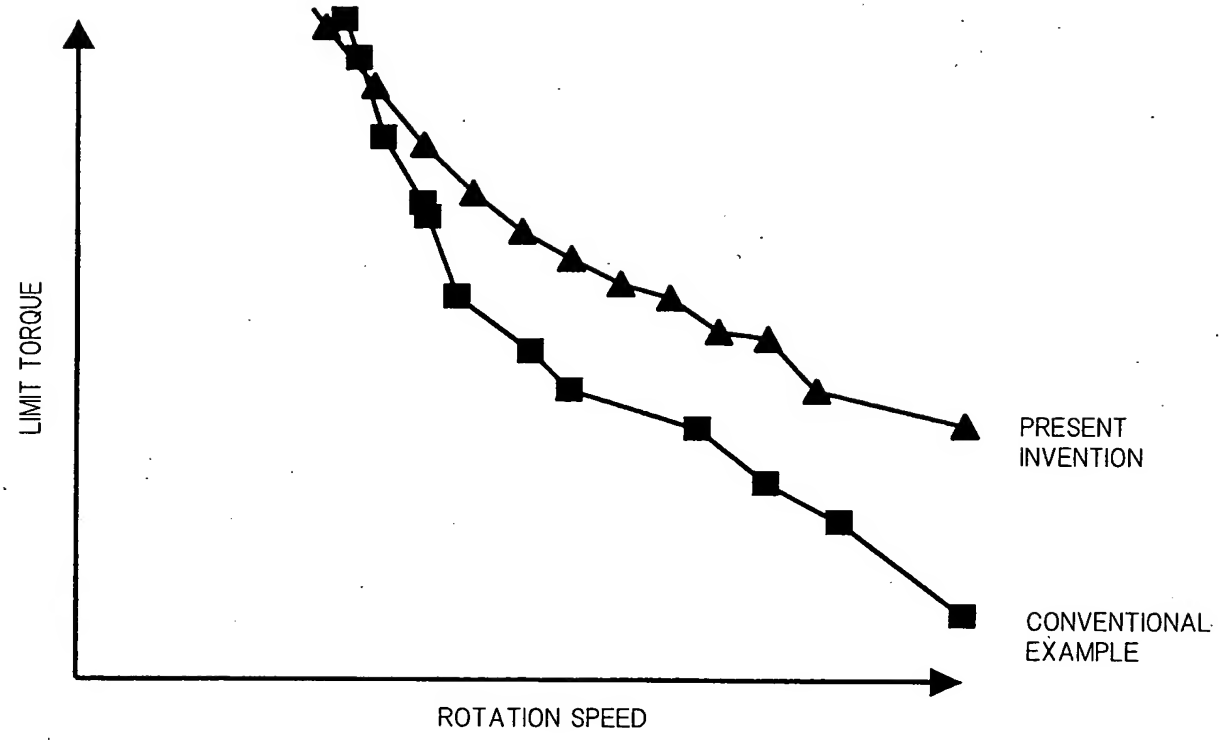
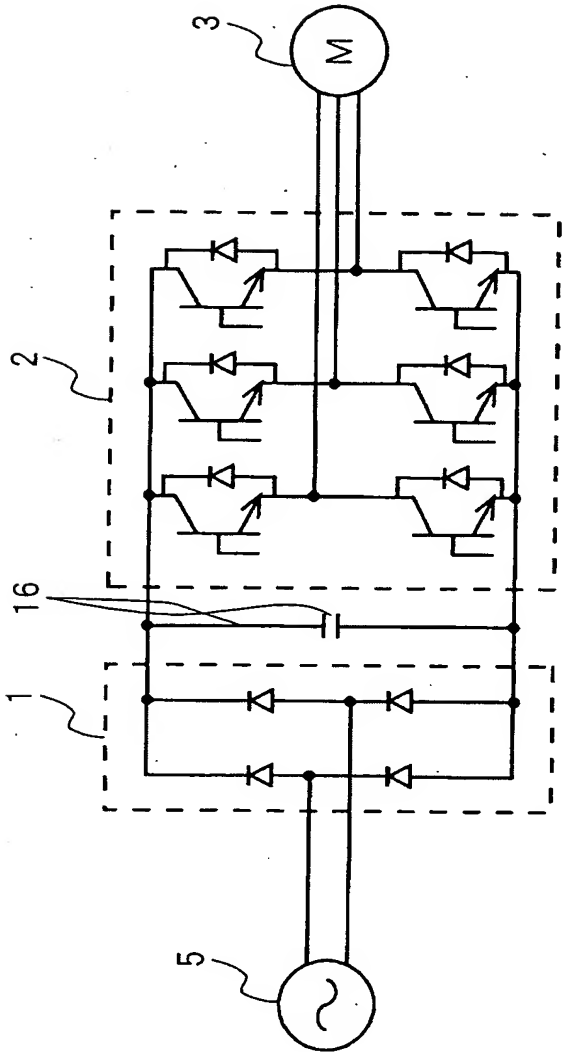


FIG. 14



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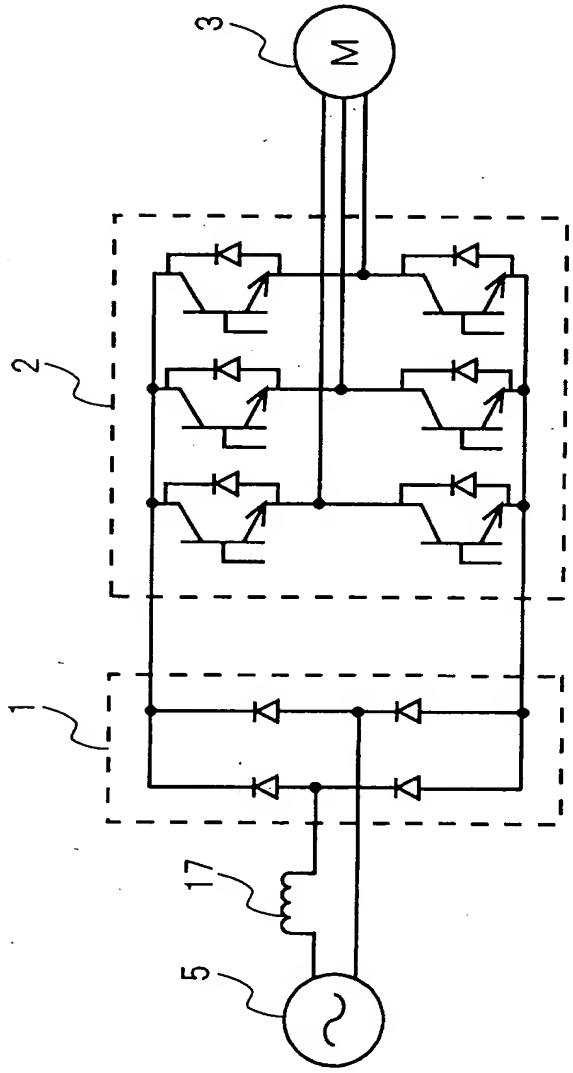
Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US **Cust. No.:** 000570
Atty. Doc. No.: 208861.0480/480US (P32440-01)

FIG. 15



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Exp. Mail No.: EV312204097US Cust. No.: 000570
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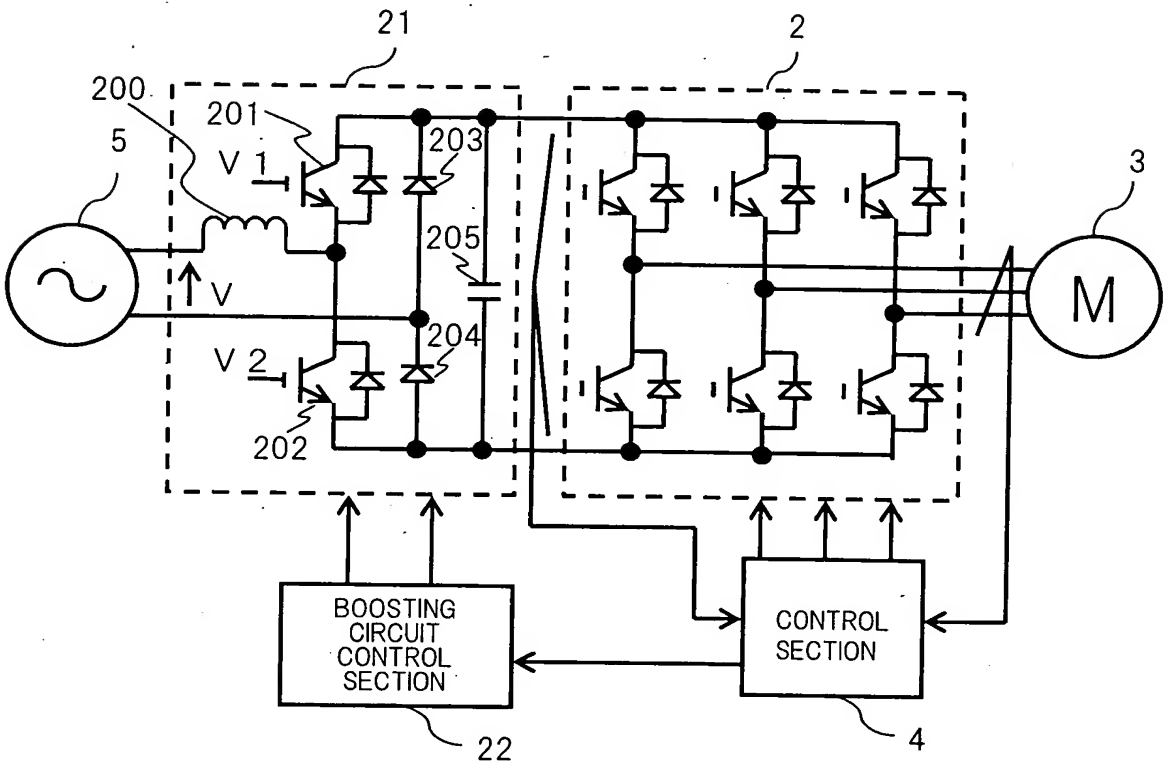
FIG. 16A



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Exp. Mail No.: EV312204097US Cust. No.: 000570
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FIG. 16B

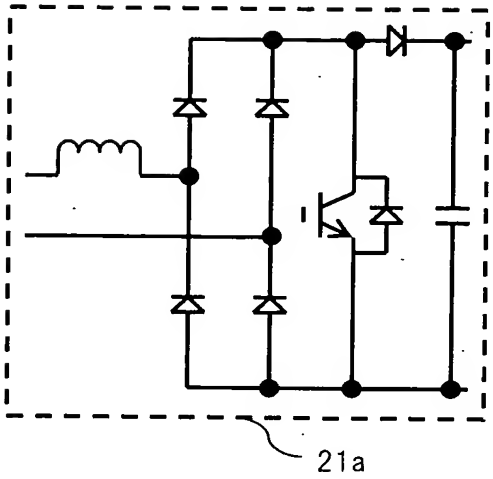

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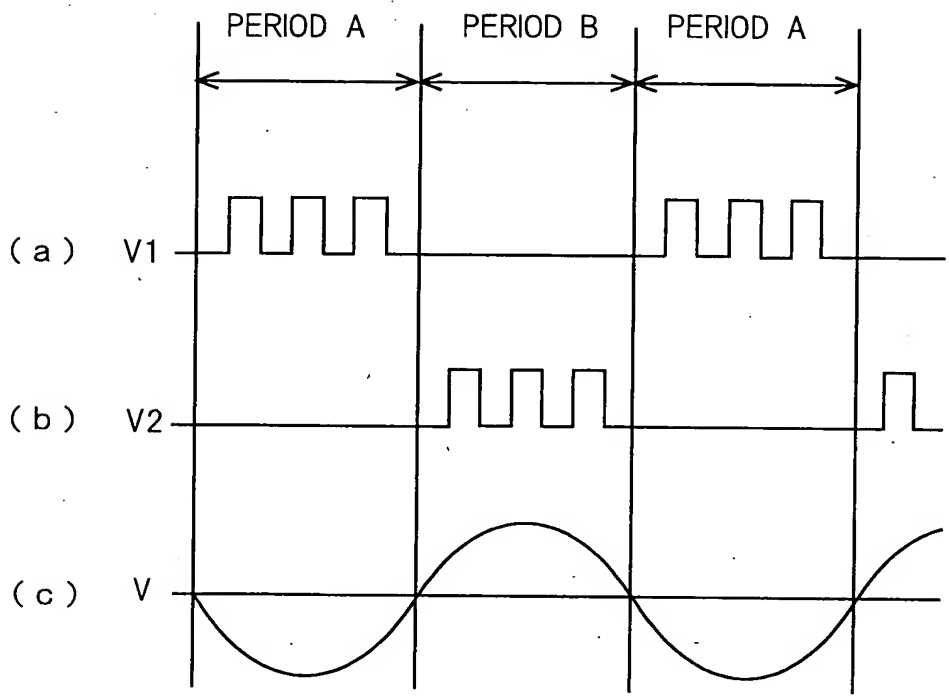
FIG. 17



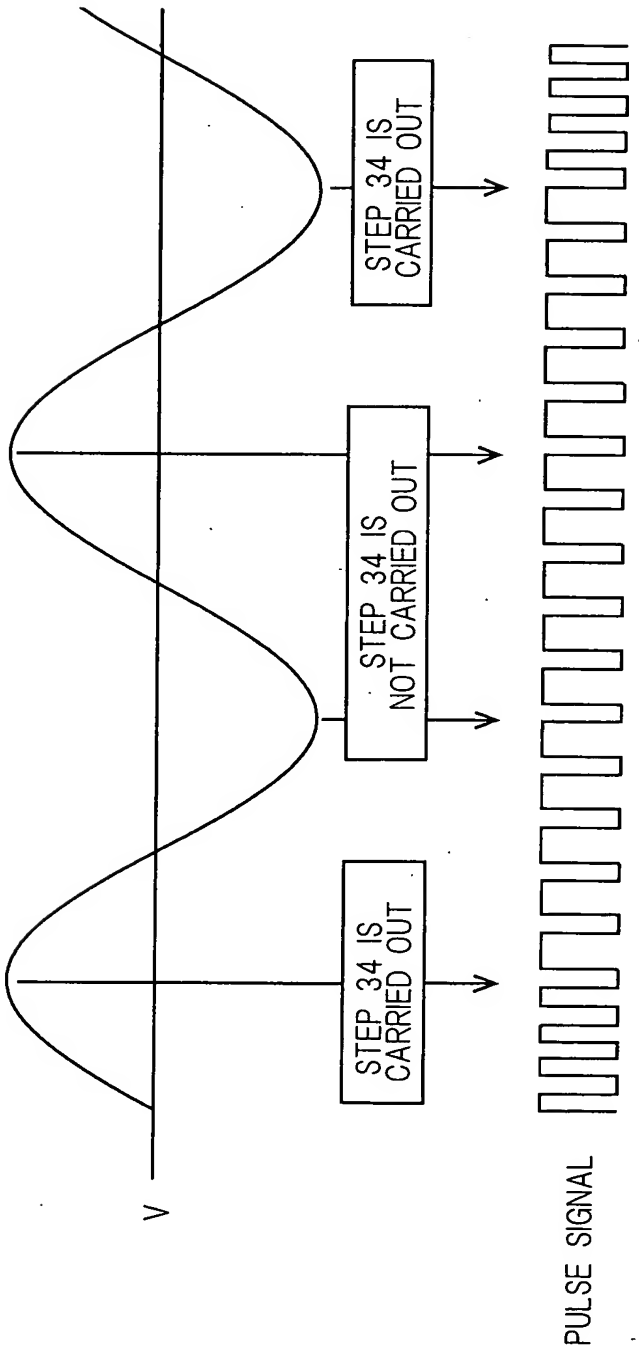

V
STEP 34 IS CARRIED OUT
STEP 34 IS NOT CARRIED OUT
STEP 34 IS CARRIED OUT
PULSE SIGNAL

FIG. 18

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Inventor: Hideki NAKATA et al.
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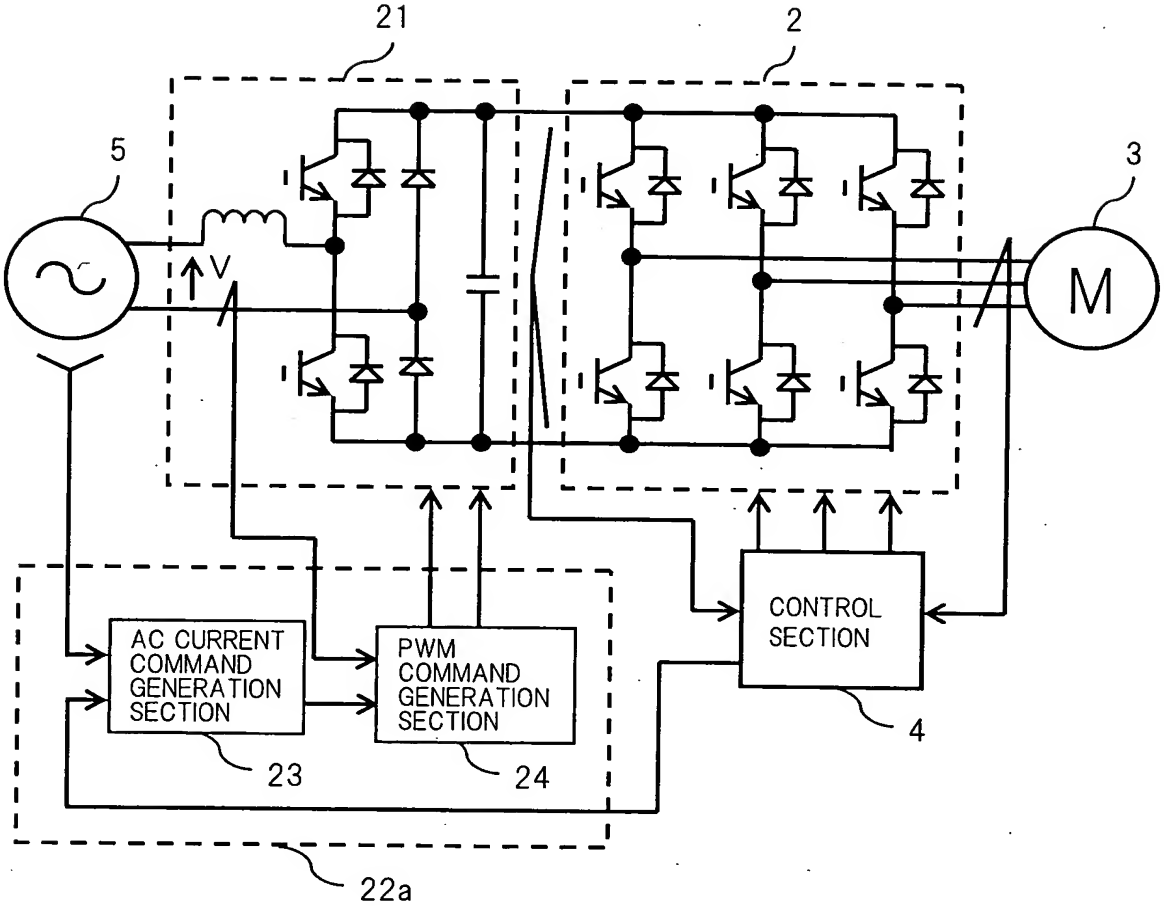
FIG. 19



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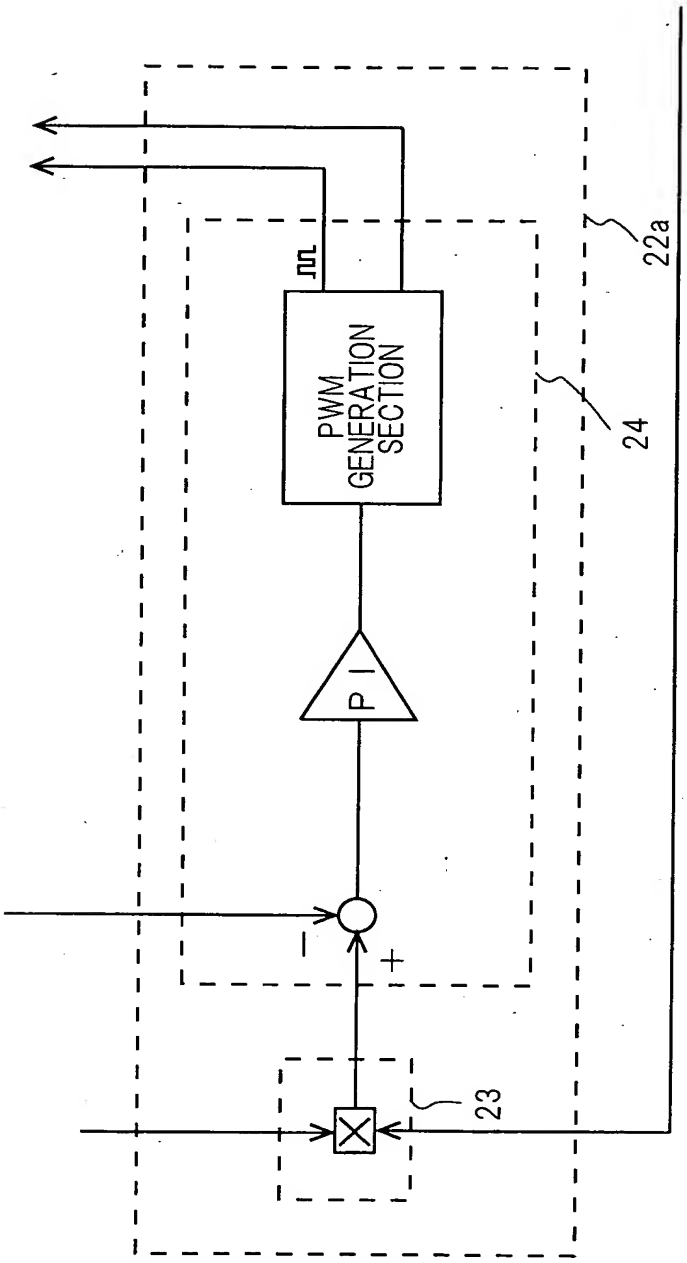
Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US **Cust. No.:** 000570
Atty. Doc. No.: 208861.0480/480US (P32440-01)

FIG. 20



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Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US Cust. No.: 000570
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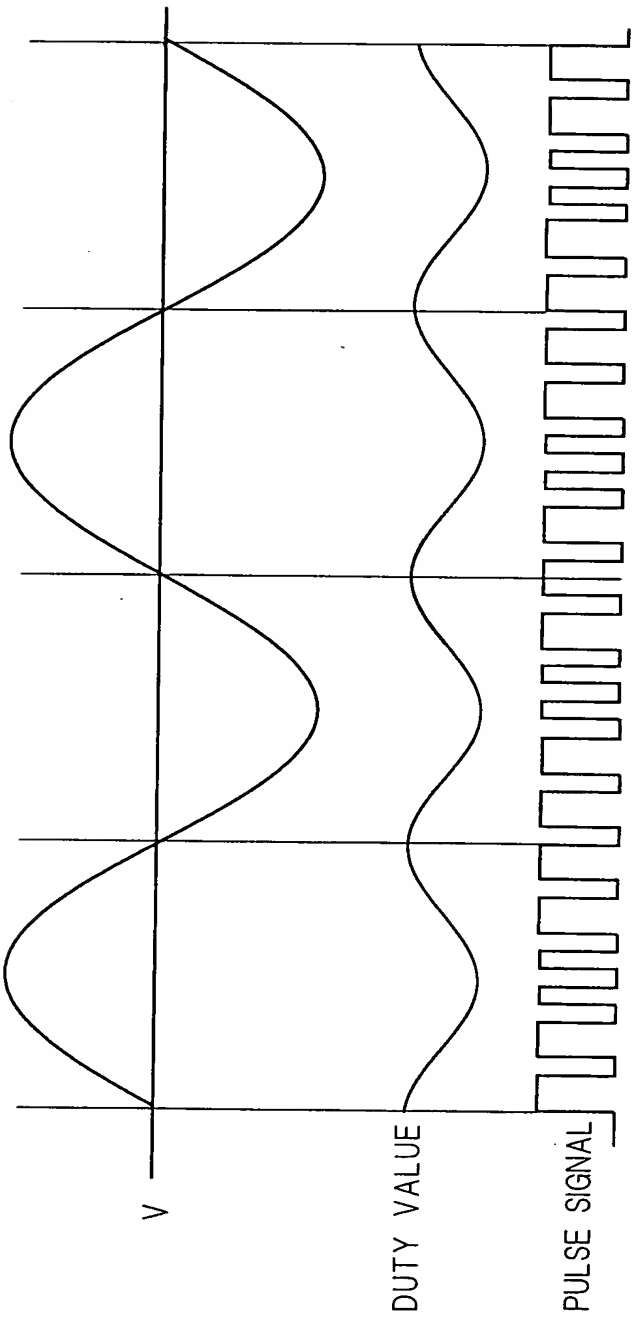

FIG. 21

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Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US
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Cust. No.: 000570
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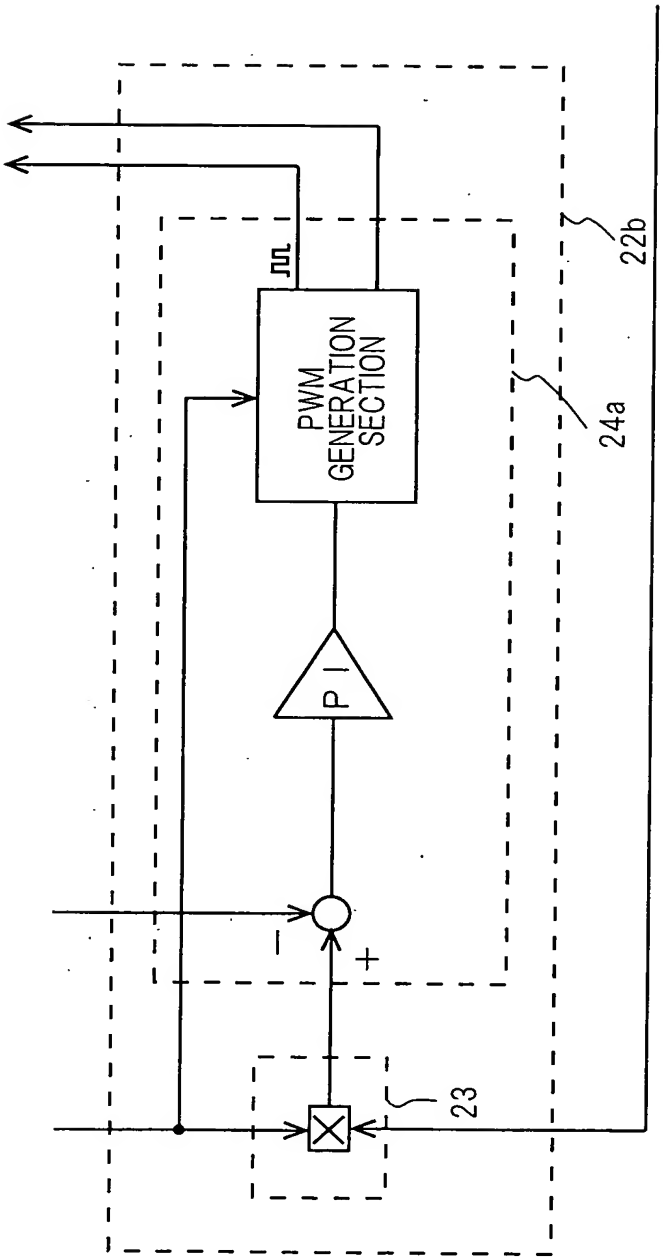
FIG. 22



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Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US Cust. No.: 000570
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FIG. 23A

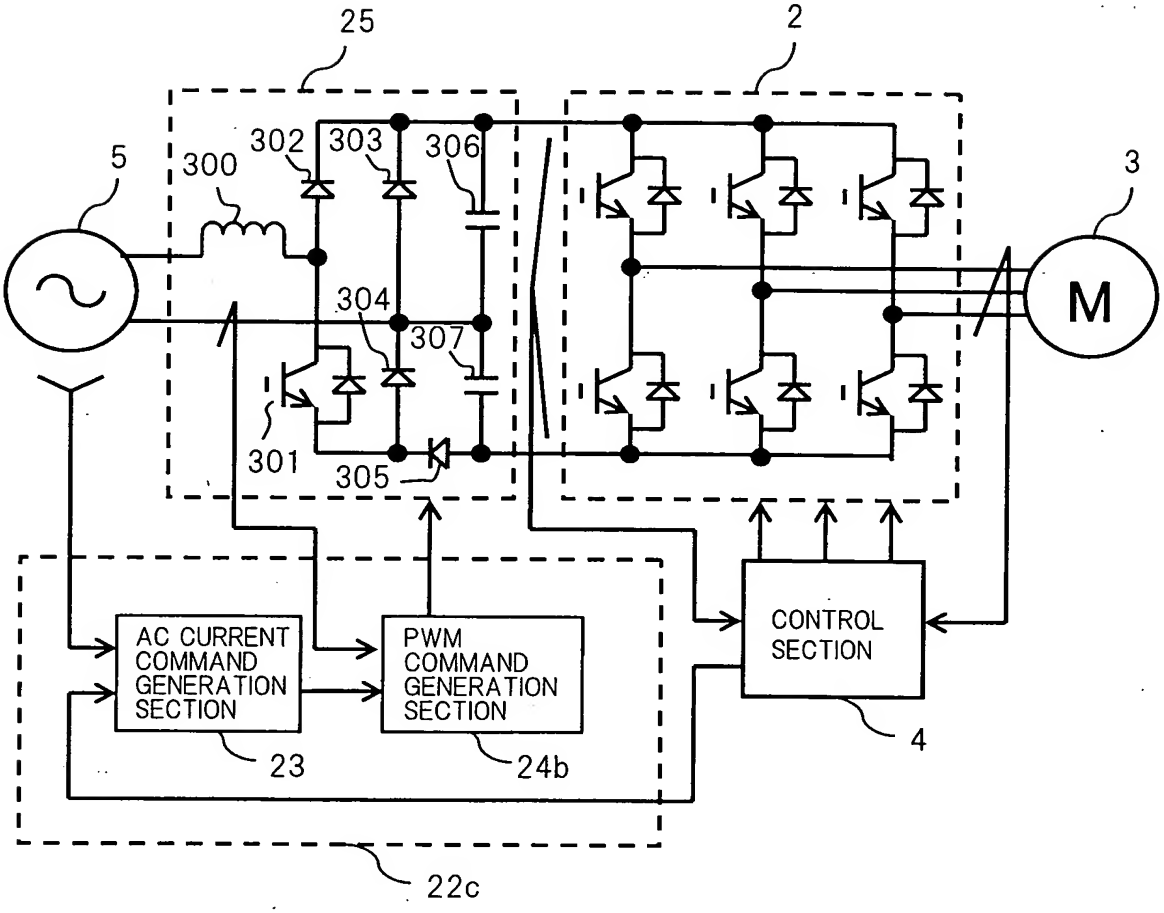
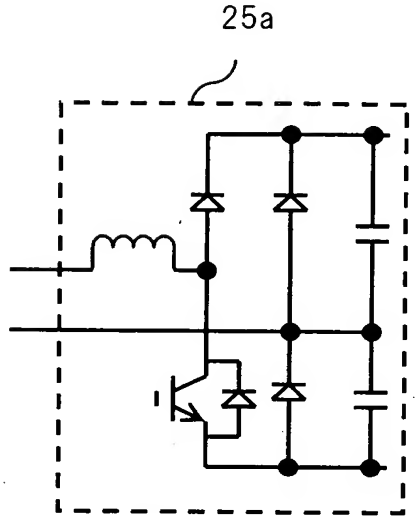


FIG. 23B



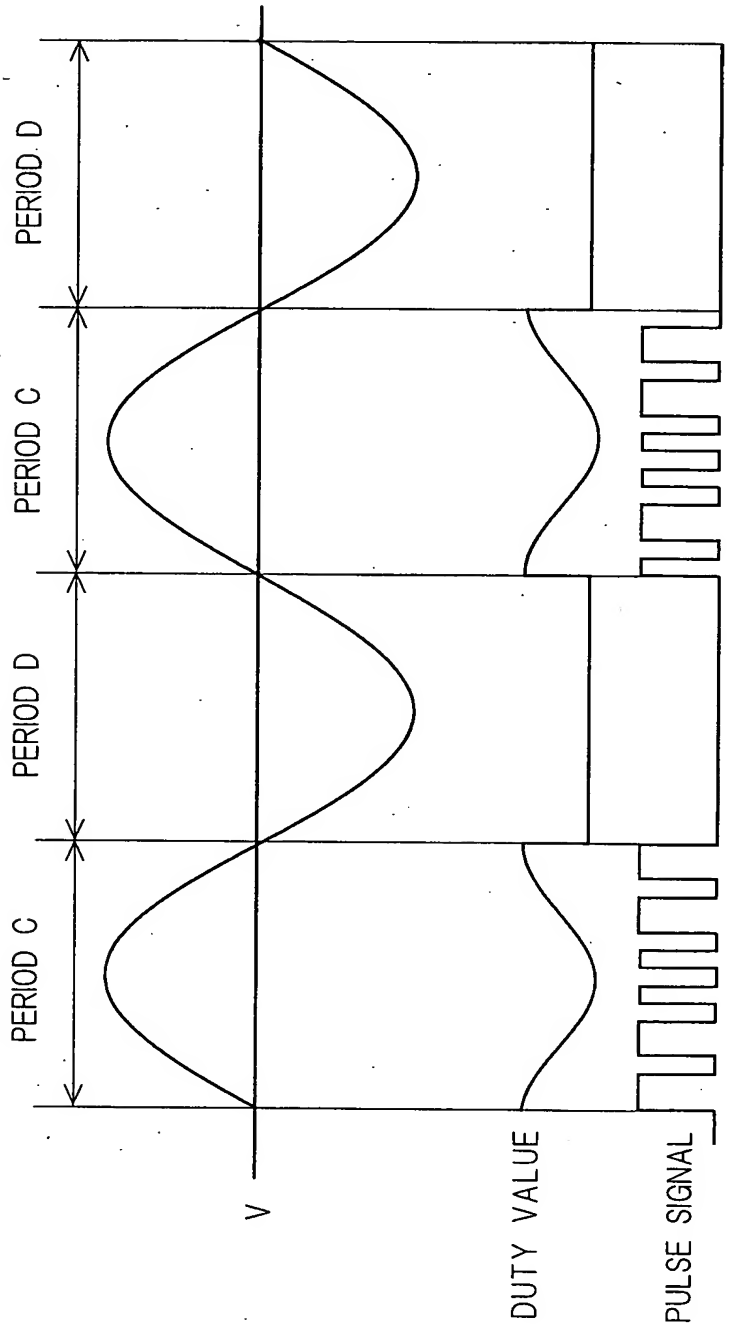
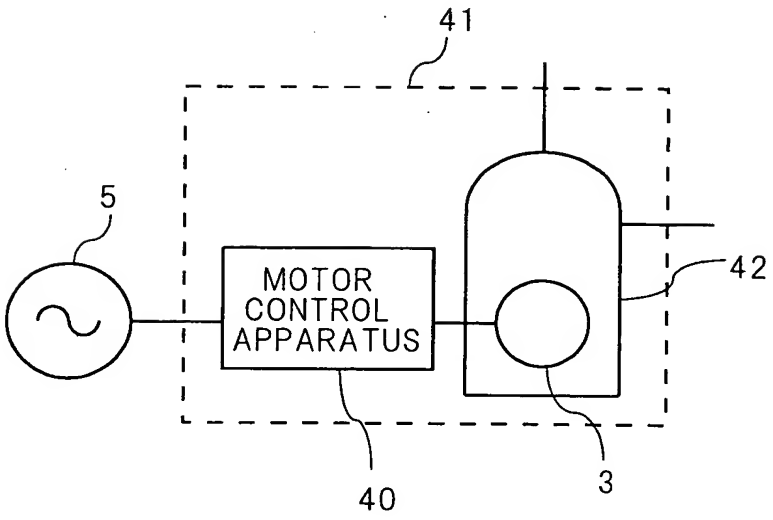


FIG. 24

FIG. 25



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Exp. Mail No.: EV312204097US
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FIG. 26

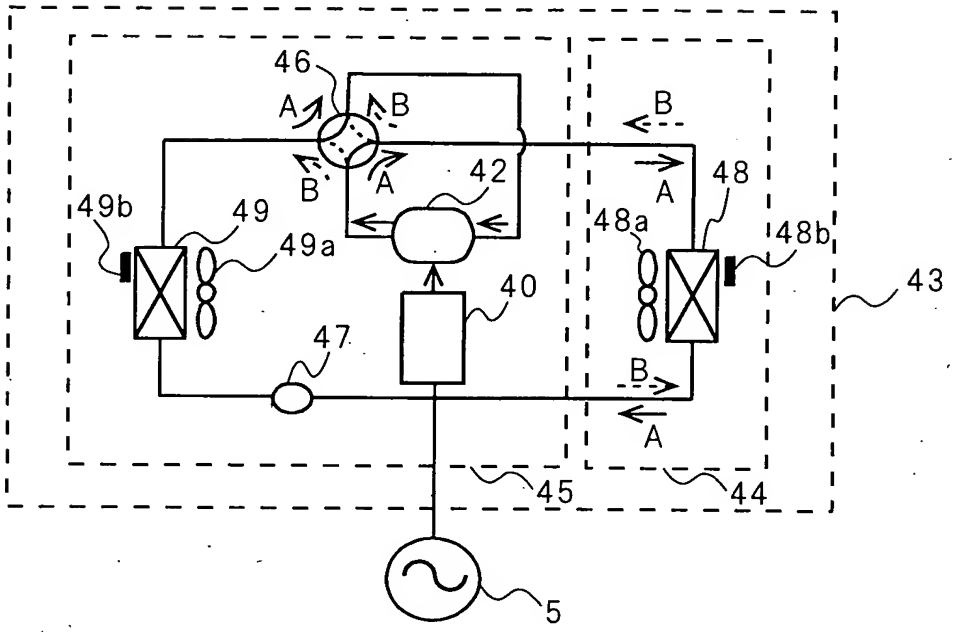

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FIG. 27

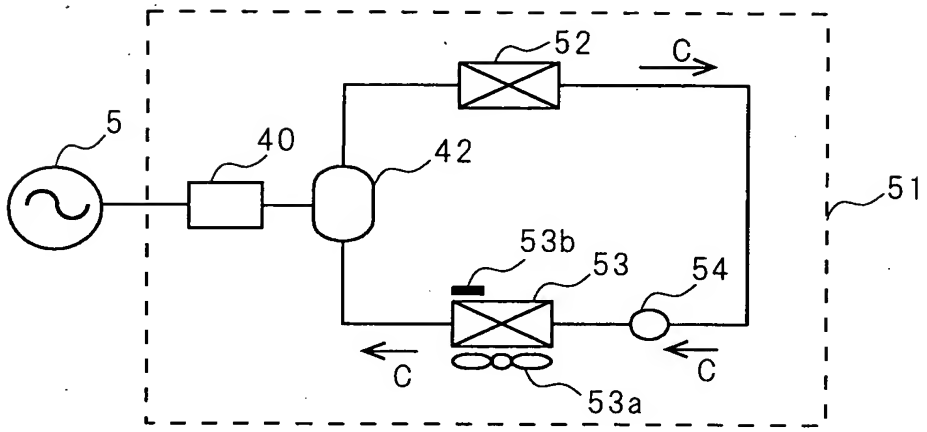


FIG. 28

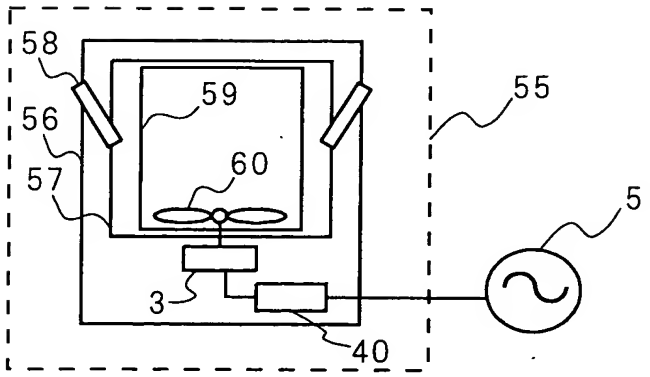


FIG. 29

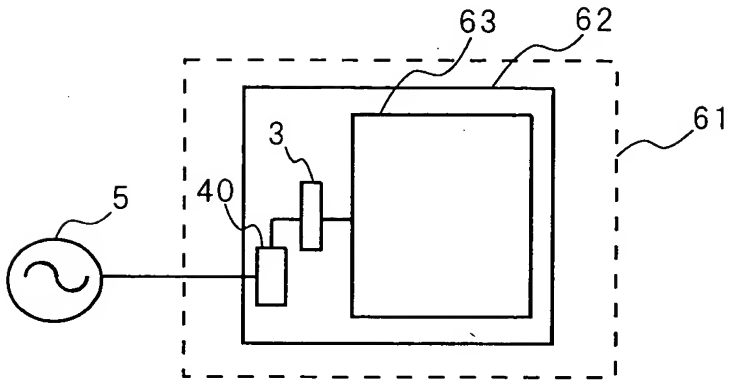


FIG. 30

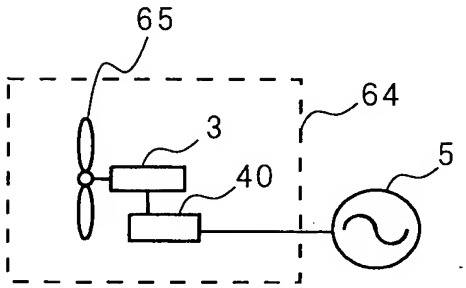
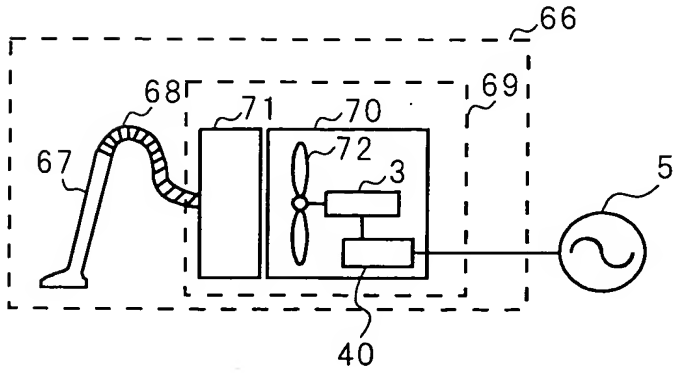


FIG. 31



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Atty. Doc. No.: 208861.0480/480US
Cust. No.: 000570
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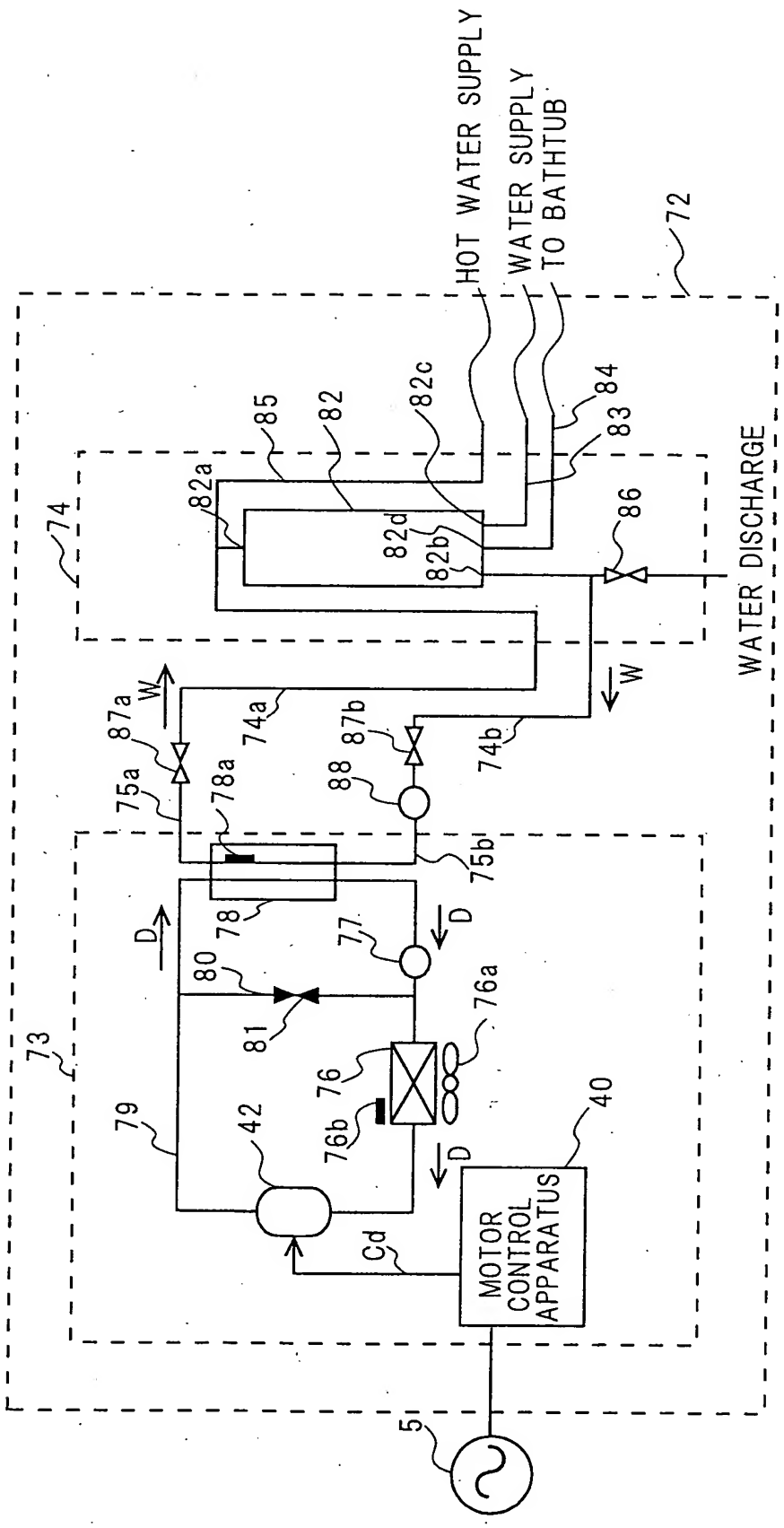

FIG. 32

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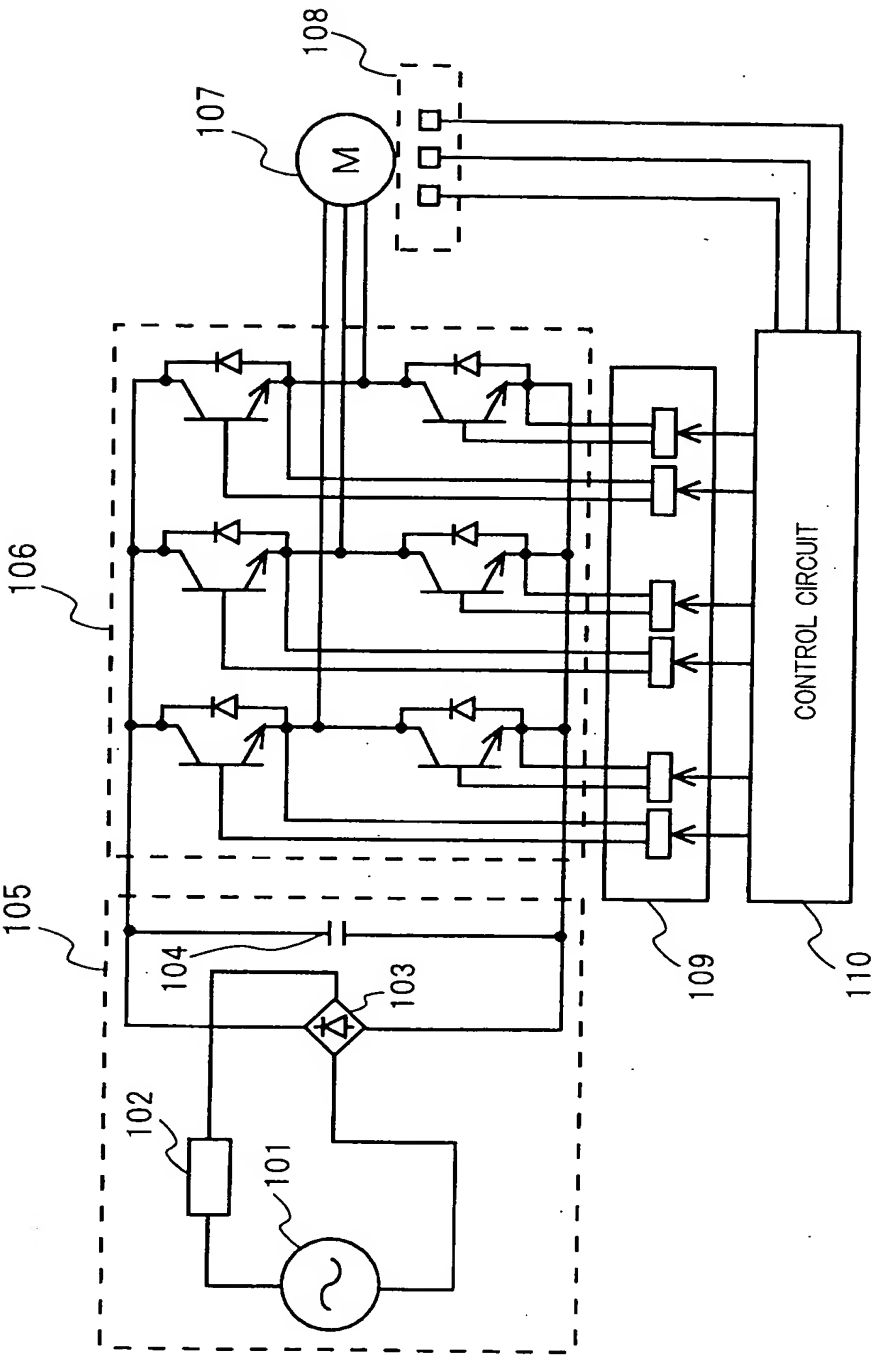
FIG. 33



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Inventor: Hideki NAKATA et al.
Exp. Mail No.: EV312204097US **Cust. No.:** 000570
Atty. Doc. No.: 208861.0480/480US (P32440-01)
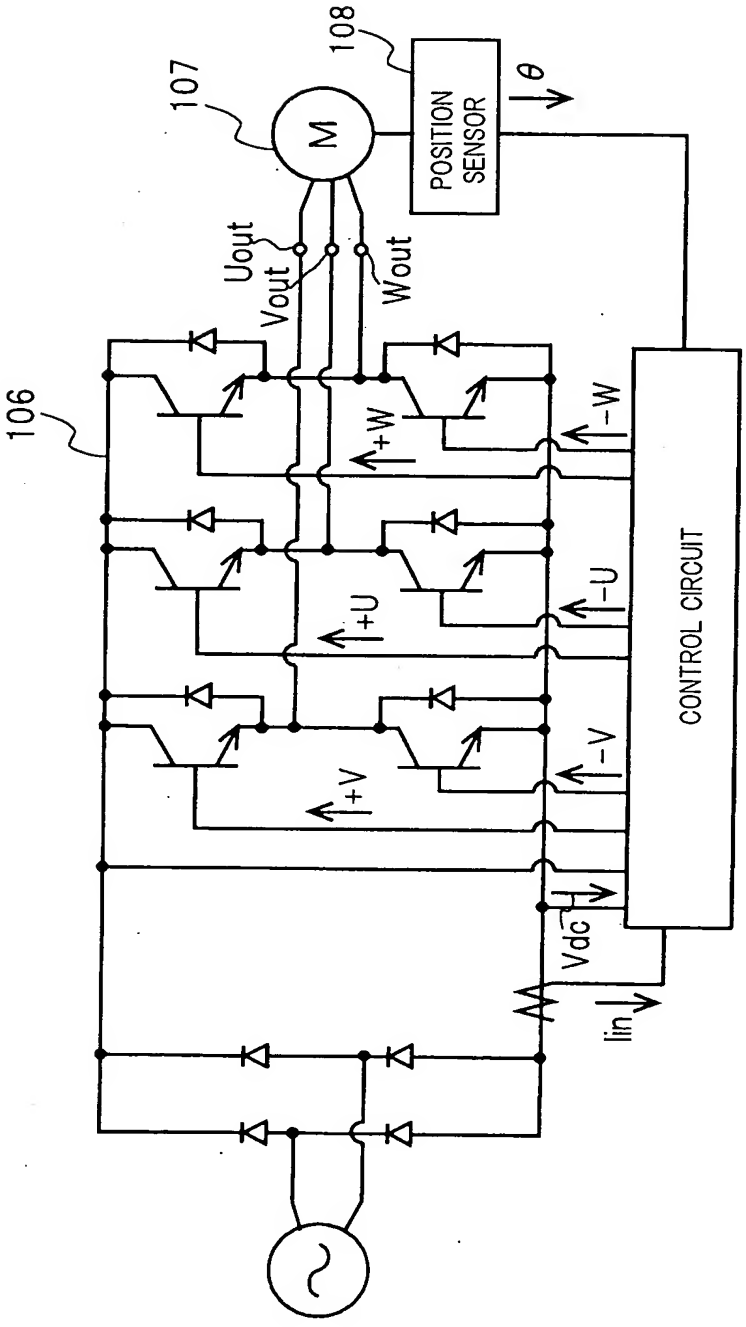
FIG. 34